PRIMAGE

Medical imaging
Artificial intelligence
Childhood cancer research

D6.1 – Requirement Analysis for the Design of the Visual Analytics System

Project Full Title: *PRedictive In-silico Multiscale Analytics to support cancer personalized diaGnosis and prognosis, Empowered by imaging biomarkers Business Place*
Project acronym: *PRIMAGE*
Project type: Horizon 2020 | RIA (Topic SC1-DTH-07-2018)
Grant agreement no: 826494

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

1. Introduction

Work package 6 of the PRIMAGE project is responsible for providing a translation of several information sources generated in other parts of the project to usable clinical knowledge. To achieve this goal, we will analyse the requirements for the final system, iteratively develop the visual and analytics components and integrate output from other work packages into a holistic infrastructure of advanced AI techniques combined with interactive visual exploration. Such a system combining intelligent analysis with interactive visualizations is called a Visual Analytics (VA) system [10]. The core advantage of a visual analytics system is to bring together the human domain knowledge and the power of computational data processing, by creating a visual interface through which these two entities can iteratively communicate. This process supports the quick and intuitive confirmation of hypotheses, as well as the interactive generation of new insights and hypotheses. Within work package 6, the requirement analysis and design process are addressed in task T6.1, which, as an intermediate result, provides this deliverable D6.1 "Requirement analysis for the design of the visual analytics system".

1.1. Scope of the document

A VA system aims to support domain experts and decision-makers in processing and analysing their data [17]. Due to the extensive amount of visualization techniques and analysis algorithms, different frameworks guide the design of a VA system. One prominent framework specialised on time and time-oriented data, as will be used in PRIMAGE, is the design triangle framework [15] shown in figure 1. It provides three guiding questions to VA designers:

- Who are the users of the VA solution(s)? (users)
- What are the (general) tasks of the users? (tasks)
- What kinds of data are the users working with? (data)

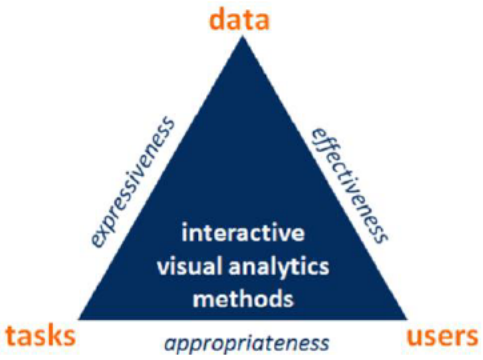

Figure 1 Visual Analytics Design Triangle

In this deliverable, we define the components of the design triangle and, based on that, provide four use cases and mock-ups for the visual analytics systems that will be created in work package 6.

1.2. Target audience

This document is targeted at different consortium members. It should help the technical partners understand the requirements for the future integration of this VA system into their infrastructure. It should help the model developers in understanding how their models will be accessed and evaluated. Finally, it should give the clinical partners an insight into the planned interface and thus inspire further discussion on extensions or on the previously provided user requirements.

1.3. Structure of the document

This document is divided into ten sections. Section 1 summarizes the scope and goals of this document. Sections 2, 3, and 4 cover the basic ingredients of the design triangle - user, task, and data. Sections 5, 6, 7, and 8 describe the four solution designs for each task with use case descriptions and mock-ups. Section 9 describes how the different tasks and use cases are integrated into one interactive visual analytics system regarding the interaction design and on a technical level. Section 10 summarizes the most important results presented in this document.

10. CONCLUSION

This deliverable summarizes the requirements for creating a visual analytics system as part of the PRIMAGE platform according to the design triangle – user, data, tasks. For the user component, we identify and characterized two central user personas to whose needs we will tailor the design and features of the system. For the data component, we categorized the available data according to relevant characteristics for creating their visual mappings. For the task component, we derive diagnosis and prognosis on with both retrospective and prospective as the four main high-level tasks. Further, the combination of users, tasks and data was addressed in four use cases with mock-ups describing how a future visual analytics system could be designed. Finally, we discuss the overarching interaction paradigm and the technical design of the system. While the main components of the system are now well defined, some risks remain regarding the actual availability of data (e.g. missing values, different interpretations) and the final acceptance of the user groups (e.g. usability, learnability, trust). For the next phase, a first version of the envisioned visual analytics system using the final dataset should be implemented and discussed together with the clinical partners. After this next iteration, new insights into details of the requirements might change and improve the overall design of the system.